

**HERITAGE AND SURVIVAL OF SPIN-OFFS: QUALITY OF PARENTS AND PARENT-
TENURE OF FOUNDERS**

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12-16 August 2006

Acknowledgements. This paper has benefited greatly from discussions with Steven Klepper and Olav Sorenson on various occasions. We thank Scott Shane, Ammon Salter, Thomas Brenner, Guido Bünstorf, Thomas Åstebro, and Rögnvaldur Saemundsson for valuable comments. We are grateful for the input received from the seminar participants at Copenhagen Business School, DRUID Summer Conference 2005, the 4th European Meeting on Applied Evolutionary Economics, and London Business School. Reichstein is grateful to the Engineering and Physical Sciences Research Council and its IMRC at Imperial College London for supporting this research. The usual disclaimer applies.

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ABSTRACT

Recent studies have shown that entrepreneurs benefit from previous employment in successful firms. This paper extends this literature by studying in greater detail how founder experiences leads to heterogeneous survival rates of new ventures. We study the survival of spin-offs and develop a measure for parent firm tenure. We argue that the length of employment in the parent organization will influence the degree to which a founder is able to replicate and adapt the blueprints of a parent. Tenure is used as a proxy for the degree of detailed knowledge the founder has acquired from previous employment and hence also how much knowledge a founder is able to transfer to a new start-up. Our results show that longer tenure at a parent firm increase survival chances of spin-offs significantly. In addition, we find that the quality of previous employers has strong effects on the survival chances of start-ups as spin-offs with surviving parent firms are more likely to survive themselves.

INTRODUCTION

Organizational sociologists have for a long time been interested in the transfer of routines and experience from a founder's previous employer to the new firm (Phillips, 2002). The argument that the blueprints of parent firms are passed on to new organizations through their founders underpins the research of such scholars as Brittain and Freeman (1986), Carroll (1984), Hannan and Freeman (1986), and Romanelli (1985; 1989). Klepper (2001) explains this phenomenon by arguing that founders of new firms transfer organizational routines from their past employers and that these organizational routines are central to the understanding of survival and market dominance. Survival and success of new organizations is therefore fundamentally shaped by the pre-entry experiences of their founders. In other words, spin-offs are able to capitalize on knowledge accumulated by their founders while employed by the parent organization.

Recent studies have shown how entrepreneurs benefit from previous employment at successful firms. It has been illustrated how several spin-offs have shown superior performance in e.g. lasers (Klepper & Sleeper, 2005), automobiles (Klepper, 2002) and disk drives (Agarwal, Echambadi, Franco, & Sarkar, 2004). These studies have not however considered the amount of time that the entrepreneurs spent at these firms. Our contribution is to include a measure of this type of employment of founders. Our argument is that the degree to which a founder is able to replicate the blueprints of a parent will be influenced by the length of tenure in the parent organization. A relatively longer tenure will enhance the amount of knowledge about the parent organization that the founder is able to transfer to the new start-up. In addition, existing literature have only partial guidance to how firms have heterogeneous resource positions that leads them to perform differently (Ahuja & Katila, 2004). Our paper is an attempt to advance this literature.

Our results show that extended tenure with an employer significantly increases the survival chances of new firms. The longer founders have been employed with parent firms in the past, the greater the chances of survival of their new firms. The quality of previous employers has an important effect on the survival

chances of start-ups. Previous employment in a good firm enhances survival chances, while survival chances are significantly lowered if the previous employer was a relatively poor quality firm.

So far, empirical investigations of the importance of experience have been based on single case studies of the evolution of selected industries, notably in the US. To complement and enhance these investigations, we look at 3512 start-ups in the Danish manufacturing sector, which were established over a period of 13 years, from 1984 to 1996, and study their survival to 2000. Using a comprehensive longitudinal panel dataset, which covers all employees, all firms and thus all start-ups in Denmark, we examine the survival rates of start-ups. We study whether spin-offs are more likely to survive given the heterogeneity of their founders' background in terms of parent firm tenure and the parent's own ability to survive. We investigate whether founders with longer tenure from their parent will found new firms with greater life chances.

In parallel with the existing literature, we find that spin-offs in general have higher probabilities to survive compared to other start-ups. In addition, our findings confirm that spin-offs have heterogeneous survival rates given the diverse backgrounds that the founders of spin-offs have and the quality that the parent firms have in terms of their own ability to survive. Longer tenure at the parent organization increases the life chances of the spin-offs. Spin-offs with surviving parent firms are similarly significantly more likely to survive compared to spin-offs with parent firms that do not survive.

The remainder of this paper is structured as follow. The following section presents our theoretical arguments and develops hypotheses. We then move on to discuss the data used and the method applied. Fourth section of the paper presents the results of our analysis, and the final section concludes the paper.

QUALITY OF THE PARENT AND PARENT-TENURE OF FOUNDERS

Klepper (2001) uses the metaphor of spin-offs as children, and past employers as parents, and proposes an evolutionary model that combines the ideas of reproduction and inheritance with the notion of organizational routines. Firms are to a large extent governed by organizational routines (Nelson & Winter,

1982) . Consequently, each firm has separate routines for the different functions (R&D, marketing, management, etc.) and products involved in its operation. The founders and/or the initial management team install these routines. Decision making at all levels will subsequently depend on these routines, and they will govern the evolution of the firm. When a new firm is established, organizations are reproduced, because founders will rely on routines they are familiar with from their previous employment experience. They will base their new firm on the organizational routines of their previous employers.

However, Nelson and Winter (1982) assume that organizational routines are embedded in organizational settings and cannot be directly transferred to a new organization by individual members of the parent organization. We extend this theory by arguing that employees in a parent firm will accumulate knowledge about the construct of the present organizational routines simply by being part of the organization. If they choose to spin off, they are able to use this knowledge to rebuild similar or improved routines in their newly founded organization.

Researchers have shown that the strategies and organizational forms of new organizations are similar to those of the organizations where the founders were formerly employed (Aldrich & Wiedenmayer, 1993), which shows that new firms rely on the organizational routines of their parents. Founders do not copy routines, but adapt and reform routines based on their experience. Partly because it is difficult, if not impossible to replicate entire organizational routines (Ahuja & Katila, 2004; Argyres & Liebeskind, 1998), but also because they see opportunities by adopting the best of the past employers routines and complement them according to their experience. As argued by Nelson and Winter (1982), organizational routines are developed over time through search, selection and repetition and it is difficult to add new activities that are not compatible with these. New organizations are likely to be more flexible in this respect, because founders can rely on the past to build the new firm on routines that are more suitable for new kinds of activities.

Empirical evidence supports the parent-progeny transfer of organizational knowledge, which leads progeny firms to follow the organizational principles of parents closely. Baron, Hannan and Burton (Baron & Hannan, 2002; Baron, Hannan, & Burton, 1999) argue that one might expect that founders previously

employed in more bureaucratic organizations in the past would desire to escape from such a model by creating a new firm with a radically different style. However, Baron, Hannan and Burton subsequently finds that founders with this profile are very likely also to pursue a bureaucratic organizational template.

Organizational sociologists (Brittain & Freeman, 1986; Carroll, 1984; Hannan & Freeman, 1986) argue that start-ups coming from existing firms represent transfers of routines and resources. They claim that blueprints are passed on from the founders' previous employers to the new firms through the mobility of these founders (Phillips, 2002). The type of knowledge transferred is not limited to codified knowledge widely available in scientific articles, strategy reports or technical specifications. It also includes valuable tacit knowledge held by individuals (Agarwal et al., 2004). Employees leave firms with the tacit knowledge generated through a process of learning by doing (Arrow, 1962) or learning by observing (Nonaka, 1994) in the course of their previous employment.

Founders of spin-offs are thus likely to bring specific tacit knowledge about a wide range of issues to their new firms, e.g. customer demand, products, technologies, suppliers and competitors (Helfat & Lieberman, 2002). Accordingly, these more experienced founders would have more valuable knowledge, which would bring a higher probability of success compared with less experienced entrants. If this holds true, the success of new entrants must depend on the past experience of their founders. Employees of incumbent firms are in a position to found new start-ups based on the knowledge acquired at and developed by the incumbent (Agarwal et al., 2004). Thus,

Hypothesis 1. Spin-offs have higher probabilities of survival.

Quality of parents

When prospective founders leave a parent firm, the initial knowledge endowment will be highly influenced by the parent's knowledge at the time of separation (Agarwal et al., 2004). This is likely to have long-term effects on the new firm's performance, since the founding condition leaves a long-term mark on the structure, culture, strategy and routines of the start-up (Stinchcombe, 1965).

In this respect, founders have different stocks of knowledge and accumulated experience, which implies that they differ in terms of their ability to recognize and follow up new opportunities (Shane, 2003). Prior knowledge and experience endows them with a stronger absorptive capacity (Cohen & Levinthal, 1990), which will facilitate the acquisition of information on market development, technological change and production processes (Shane, 2003). This, in turn, will increase the ability to start a new successful firm. The knowledge obtained at a parent firm may hence prove a crucial factor for any start-up. It includes knowledge about how to exploit new knowledge and technological developments in the particular industry (Cooper, 1985; Roberts, 1991). However, the benefit is not related only to knowledge about the technological development of the product in question. According to Shane (2003), this absorptive capacity is also enhanced by two other types of knowledge: knowledge about markets and knowledge of how to serve them (as found by Shane, 2000). This can be knowledge about supplier relationships, sales techniques or other market related information. Similarly, knowledge about how to serve markets will increase the ability to identify opportunities, because it will improve understanding of the production and marketing gains associated with a new product. A founder with experience in the industry with respect to this process is more likely to be able to exploit such opportunities, and the start-up is more likely to be founded on the basis of experiences and organizational routines that have proven successful in the past.

As a consequence, the initial endowment differences between start-ups will lead them to develop along heterogeneous paths (Shane & Stuart, 2002). This implies that the inherited knowledge is related to the ability of a spin-off to generate knowledge in the future (Agarwal et al., 2004). As argued by Klepper (2001), better parents will generate better spin-offs, because they will rely on the better routines of their parents. Starting with a good model will positively affect the long-term performance of a firm (Cyert, Kymar, & Williams, 1983), since it is difficult to change the initial blueprints. Changes in organizational blueprints are likely to severely destabilize organizations. In fact, evidence show that firms trying to change the original blueprint strategy more than double their probability of failing (Baron & Hannan, 2002). Entrepreneurs imprint their initial choices in their organizations. This will determine the

development paths of the new firms (Hannan and Freeman, 1977 AJS and Hannan and Freeman 1984 ASR, Baron, Hannan & Burton 1999, Higgins 2005). The combination of a good model and superior knowledge endowment acquired from a quality parent, will results in higher performance of the spin-offs. We can accordingly hypothesize that:

Hypothesis 2. Spin-offs with surviving parent firms have higher probabilities of survival.

Parent-tenure of founders

Above we have argued that there is a significant transfer of knowledge from parent to progeny, which improves the survival chances of these spin-offs. We extend this theory by arguing that the length tenure of founders with the parents is another explanation for the superior performance of spin-offs observed in many existing studies.

Founders acquire tacit knowledge from their parent, which they bring to their new firms. However, the duration of employment at a parent will differ and this almost inevitably will influence their degree of knowledge absorption. If founders have spent a relatively longer time as employees in their parent organizations, the amount of knowledge embodied in these founders is likely to be much higher than in founders with shorter tenure. In this respect, founders with longer tenure have a better view of the organization and have a broader knowledge gathered at all levels. Their perception of the organizational routines and rules governing the parent will be better and more complete than founders with shorter tenure with previous employers. This will enable them to replicate the success of parents in their own firms by adapting and reforming the routines of the past. Their knowledge endowment will simply be superior to that of other founders.

We argue that less experienced founders with relatively lower tenure will have less experience to build their new organization on. Relatively more experienced founders will, on the other hand, have a large base of reference, since they have had a relatively longer time to absorb and accumulate knowledge on the parent organization. This will enable them to adapt and reform routines relatively better. They will learn from the parents and do a better job, even in the event of parent failure as well as success

This extension of the theory implies that there are different strengths of inherited knowledge between spin-offs. Above we argued along with many scholars that spin-offs are likely to have better chances of survival compared to other start-ups. Here we conjecture that founders with a relatively higher amount of tenure achieved at their parents will have a better performance than other spin-offs as a result of a superior knowledge endowment and a more complete knowledge about the organization routines of the parent. Thus, we hypothesize that:

Hypothesis 3. The combined tenure of founders from the parent firms increases the survival chances of the spin-offs.

DATA AND METHODS

Data: The Integrated Database for Labor Market Research (IDA)

In order to investigate our hypotheses, we rely on a comprehensive dataset comprising information about the entire Danish economy. This dataset combines detailed information on all individuals and all establishments, gathered from the official registers of the Danish government, which, because of its extensive welfare policies, records unusually detailed information about economic activity in Denmark. It covers all Danish firms and plants as well as the entire Danish labor market. The dataset, known as the ‘Integreret Database for Arbejdsmarkedsforskning’ (IDA - ‘Integrated Database for Labor Market Research’), is maintained by Statistics Denmark. The dataset is internationally recognized and acknowledged to be invaluable for economic and other social science research. Recent research that has exploited this source includes Albæk & Sørensen and Sørensen .

IDA contains several elements and characteristics that make it particularly interesting for economic and social science research. First, it holds extensive information about the characteristics of individuals, e.g. sex, age, length and level of education, work experience, occupation, family status and relations, household characteristics, wages and other income, wealth, and unemployment. Second, individuals are matched directly with establishments and employers. It is possible to distinguish between plants and firms,

which are characterized by their location, industrial affiliation and other basic information. Third, the database is longitudinal. It has been updated annually since 1980, and thus it is possible to follow individuals, plants and firms from year to year.

Also, the identity of plants and firms is preserved over time. If a plant is bought by another firm, the plant retains its original identity, unless the majority of its employees leave. This means that unless the structure and the group of employees changes as a result of the takeover, a plant that is taken over will not be classified as an exit.

Our study takes a different starting point from other studies in this area. These existing studies are generally narrow, single industry studies, where the entrants into the industry can be diversifiers from other industries. So entrants in these studies are not necessarily new firms, but can have a background in other industries. In the present study, all entrants are new firms. In fact, we are able to capture all start-ups in the Danish economy using this dataset. We are not able to follow very specifically defined product-based industries, such as automobiles, semiconductors or lasers, but have to rely on aggregations of statistical industry classifications. The data sources used in this study carry anonymous entities, which prohibits us from clearly studying the relationship between the products and business lines of parents and progeny. Again, we have to rely on statistical industry classifications. Our contribution nevertheless complements the existing studies, since it tries to replicate the regularities by using a wider sample of firms within a narrower timeframe.

Identifying start-ups, founders and spin-offs. Using this database, we identify for the analysis all new entrants in the manufacturing industries from 1984 to 1996. When identifying new firms, we compare one year to the next and identify start-ups accordingly. We look for new plants in new firms. Start-ups are thus defined as plants with no prior identity number and which are associated with a firm that has no prior identity number. This method is also used by Eriksson and Kuhn (2006) on the same dataset. We follow all start-ups through the remaining years of the dataset (end-year 2000). We do not consider start-ups founded after 1996, since the length of time since their founding to 2000 is too short.

If another firm has acquired the start-up plant in this period, it is assigned as a takeover. The start-ups that disappear from the dataset are categorized as exits. In total from 1984 to 1996, there are 3512 observations in our sample that carry information on their management and founding team.

All entrants are linked to the data on individuals in the database. Using the occupation variable, the top-ranked members of each entrant are identified. These individuals are the founders and/or the initial management team of the entrant. This method is also used by Nanda and Sørensen (2006) on the same dataset. It is important to note that, given the construction of the dataset, we are unable to clearly identify founders. However, we can accurately identify initial managers. We argue that the vast majority of new Danish firms are very likely to be managed by their founders, and therefore we assume that this is the case. In addition, the theoretical framework can be applied to managers as well, since the same analytical aspects relate to the experiences of managers as founders.

Based on information for this management team, we construct a dummy variable indicating whether the entrant is a spin-off. A spin-off in this study is defined as a start-up if at least two members of the management team were employed in the same firm active in the same six-digit industry classification the year before its founding. The reason for choosing this criterion is that we use a rather broad definition of industries based on the industry statistical classification. If two persons leave the same firm to start a new one, this is relatively more likely to be in the same product-based industry than in the situation where one individual leaves a firm. Thus, our spin-offs are more likely to be intra-industry spin-offs, which fit our theoretical framework. This criterion for spin-offs was also chosen to cope with the problem of not being able to identify founders in the dataset. Existing studies have shown that if spin-offs are managed by two or more people, and they come from the same parent, they are very likely also to be the founders (as found by Klepper & Sleeper, 2005). Consequently, we are likely to have identified the founders for our spin-offs variable. However by using the two members criteria for identifying spin-offs, we also put a lower limit size of two employees on the spin-offs. Including one employee start-ups in our sample would create an estimation bias. For this reason we only look at start-ups that consist of two employees or more.

According to this method, spin-offs can be associated with more than one parent firm. This has important implications for the definition of explanatory variables. If a spin-off has more than one potential parent firm, we chose as the parent the one, where the most founders come from. In the rare case that this still leads to more parents, we chose as the parent the one, where the founders with the highest annual income come from.

Quality of parents. We test the hypothesis of parent firm quality by including three dummy variables expressing the survival of the parent firm: A dummy for cases, where the parent closes in the same year that the spin-off is founded; a dummy for cases, where the parent closes one year after the spin-off is founded; and finally a dummy for cases, where the parent closes two years after the spin-off is founded. These three variables will show the effect of parent closure on the survival chances of spin-offs. This will test the theoretical argument that weak parents will spawn weak spin-offs. However, we should emphasize that weak performing firms, especially large firms, might continue to survive because of their size. In these cases, survival of firms is not the most appropriate indicator for quality. It is, however, the best indicator available in our dataset.

Tenure with parent firm. This variable is defined as the average number of years that the founding team of a spin-off was employed by the parent in the four years prior to the founding of the spin-offs. Our theoretical argument is that the longer the founders of spin-off have been employed at the parent firm, the longer they have had to absorb the organizational characteristics and generate knowledge specific to the parent. This means that our measure is sensitive to the window of possible tenure that the founders are facing. In the present definition, the maximum average tenure with parent firm of a spin-off is narrowed to four years, because we cannot go back in time for more than four years, when we include start-ups from 1984. To test the robustness of this specification, we have estimated our models excluding the start-ups from 1984 to 1989 and with a ten year tenure window. The results are consistent with the results of the original sample with a four year window. Since the number of observations is considerably larger for the original sample, we report the results of these.

If the results of the estimations show a negative impact of tenure on the hazard of spin-offs consistent with our theoretical arguments, one could argue that we are picking up other effects that are otherwise unaccounted for. The effects could be explained by general industry experience. Accordingly, we control for general industry experience of founders by including a measure for the average number of years that the founders have been employed in the industry in the four years prior to the founding of the firm. This variable is weighted over time, so more recent industry experience is valued higher than experience from the past. We have applied different methods of weighting, e.g. linear and exponential. The estimations are consistent regardless of the method applied. We report the exponential measure in the models presented.

Occupation at parent. Given our theoretical arguments, it is relevant to investigate whether the occupation of the founders at the parent firm influences the survival of start-ups. It is plausible that founders ranking at the very top of the parent organization have had an advantage in terms of the access to important knowledge relative to lower level employees. We test for this effect by including variable calculating the proportion of founders, which were employed at the top management level of the parent immediately prior to the founding of the new firm.

Parent size. We include the size of the parent measured by the number of employees in the year of the spin-off event. We use this in its clean form in the estimations, as we have found that a logged version will introduce severe multicollinearity. Controlling for parent size is in line with the findings of Sørensen and Phillips (2004), who found that self-employed individuals coming from small past employers are more likely to survive and perform well financially compared to individuals coming from larger organizations. Second, we have tried to include the parent age in your estimation. This is the number of employees in the first year of business. Second, we include the logarithm of the size of the parent (if applicable). Similarly, this is the number of employees in the year before the new start-up was founded. However, the data permits us from studying this in detail, since we only have information about the age of firms founded after 1980. Firm founded before 1980 appear to be founded in 1980 in our dataset. We have tried to add a simple dummy for parents that are four years older than their spin-offs. This did however correlate

strongly with our tenure variable, since it is by definition impossible for founders with high tenure to come from parents that are younger than four years.

Controls. We include a number of different variables, which have been included in analyses of firm survival in industrial organization (i.e. Audretsch, 1991, 1995) and organization ecology (i.e. Brüderl & Schüssler, 1990). This should insure that we are not just picking up noise from omitted variables. Most importantly, we want to ensure that any finding on the above variables cannot be associated with the start-up size of the new firms. According, we include the logarithm of the initial size of the new start-up. This is the number of employees in the first year of business.

Second, we include three variables controlling for the level of education of the employees in the firm. We apply the same method as Åstebro and Bernhardt (2003) in constructing variables that denote the relative share of employees at various educational levels. We consider three levels of education. High level is lengthy education, equivalent to a five-year university education or higher. This includes all university masters and doctoral programs. Medium level is education equivalent to all university bachelor level programs, or similar length and level of education from another type of education institutions. Low level is a short education equivalent to a high school degree, tradesman/craftsman education, or similar education up to three years duration after primary school level. The benchmark for education is the level of primary school.

Third, we follow Brüderl and Schüssler (1990) and include a control for the legal construct of the start-ups. We included a dummy for the start-ups with are corporations or incorporated ventures from the first year.

Fourth, we control for geographical differences associated with urbanization effects by including a dummy the start-ups located in the Copenhagen metropolitan region. Brüderl and Schüssler (1990) and Eriksson and Kuhn (2006) also control for this.

Fifth, start-ups might generally be influenced by the general economic climate of the economy. We control for this by including the annual growth in GDP (fixed prices). The source of this data is the OECD Economic Outlook No. 78. The growth in GDP is added as a time-varying covariate.¹

Finally, we include non-reported industry fixed effect on the 35 different industries that are available for manufacturing firms for the period that we are looking at.

RESULTS

Descriptive Statistics

The majority of the start-ups (61.3 percent) exit during our window of investigation. Table 1 reports the basic descriptive statistics of the remaining variables of our study as well as the correlation matrix. The means reveal that 13 percent of the observations may be categorized as spin-offs. A substantial number of the correlation coefficients are significant at a 5% level. The majority of the correlations are nevertheless low and do not cause concern with regard to the estimations with regards to multicollinearity.² The highest correlation coefficients are not surprisingly between the spin-off dummy and the spin-off related variables.

Insert Table 1 about here

Regression results

Our data is yearly observations. We cannot identify the specific time of the year at which a start-up is founded or exit. We can only identify the year in which it is founded or goes out of business. This means

¹ We also tested for further unobserved temporal effects by including year dummies for founding year. This did not influence our results.

² We tested for multicollinearity using the variance inflation factor (VIF) method. We found the highest VIF to be 4.18 confirming that multicollinearity is not a concern.

that survival occurs in continuous time but spell lengths are observed only in intervals. The data is hence discrete time data and we accordingly follow Agarwal, Sarkar, and Echambadi (2002) by using a probit model to estimate the hazard of start-ups.

The results of the probit regressions are summarized in Table 2. We introduce the main variables of interest in a stepwise procedure. Four models are summarized. Model 1 includes the binary variable for whether the firm may be categorized as a spin-off as well as the parent size variable. In the second model, we introduce the tenure and industry experience variables, while Model 3 adds the parent quality variables. Finally, Model 4 introduces the variables expressing the proportion of founders that have top-management experience.

The stepwise procedure suggests the inclusion of all the spin-off related variables to be of importance. While the spin-off dummy is significant in model, it is insignificant after the introduction of tenure and general industry experience. The spin-off dummy in Model 2 also capture the spin-off firms that have parents that exit the market within two years of the start-ups, which can explain the lost significance. However, when the binary variables for parent exit time are introduced, the spin-off dummy retains its significance. In, Model 4, tenure is still significant, but the impact is reduced by the introduction of the top management experience. This suggests that while tenure is an important factor in explaining the survival of the spin-off, some of the significance of this variable in the previous models can be attributed to the fact that the founders has previous experience from being part of the top management team of the parent firm.

 Insert Table 2 about here

Hypothesis 1 stated that spin-offs are more likely to survive compared to other start-ups. Our results support this hypothesis by suggesting spin-offs have a 20% higher chance of surviving. This shows that

start-ups generated from within the industry by founders, who were previously employed in the industry are more likely to survive.

In Hypothesis 2, we argued that spin-offs have a higher likelihood of surviving, if the parent firms are able to survive themselves. This is a proxy for the quality of the parent organization as whole as we argued that the survival of the parent firm to some extent reflected the quality of the parent firm. The regression results exhibit significant positive effect of the fate of the parent firm. Spin-offs are significantly less likely to survive if the parent firm exits in the same year that the spin-off is founded. The parameter estimate (0.389) suggests the probability of survival is approximately cut in half for these. Hypothesis 2 is hence supported by the regression results.

We find support for Hypothesis 3, which arguing that the founders' combined tenure from the parent firm would have a positive impact on the survival chances of the spin-off. The tenure estimate is negative and significant, which shows that spin-offs is significantly more likely to survive, if the founders have been employed for a relatively longer time at the parent firm. The likelihood of survival is further enhanced for these firms, if the founders were employed as members of the top management team of the parent firms. The proportion of founders with top management team experience is significant and negative. Thus, we can confirm Hypothesis 3. We have tried to integrate the dummy for parents that goes of business in the same year with the tenure variable to examine, whether tenure from a dying parent will positively or negatively influence the probability of survival. However, this measure introduced a severe case of multicollinearity as it is obviously quite strongly correlated with the tenure variable itself. As a consequence, we have dropped this interaction effect. So far we have not been able to otherwise control for this effect.

Among the remaining variables, we find support for an increased death rate among spin-offs from large parent firms. Firms founded in the Copenhagen area are also more likely to fail. We find that small start-ups are less likely to survive. Firms founded in economic booms are more likely to survive. We find no consistent pattern for any of the education related variables.

Similarities between Parents and Spin-offs

One of the major assumptions in this paper is that spin-offs build on their parents' routines. This leads us to expect that they also share characteristics with their parent firms. Table 3 presents the Pearson correlation coefficients between the spin-off and the parent values for seven industries and the total sample regarding five different demographic characteristics. The five variables considered are proportion of female employees; average wage of employees; average education level; average level of labor market experience of employees; and proportion of top-managers in the firms. We also analyzed the proportion of spin-offs that were located in the same region as their parent. Of the 465 spin-offs in the sample, about 74 per cent are founded within very close proximity to their parent firm.

 Insert Table 3 about here

Table 3 shows that the structural similarities between spin-offs and parents are high. Most Pearson correlation coefficients are positive and significant at the 1 per cent level, suggesting the measures move in the same direction. We calculated the coefficients for the different industries in order to ensure the results were not reflecting differences between industries. The results indicate a strong correlation between the structures of the spin-offs and their respective parents.

DISCUSSION AND CONCLUDING REMARKS

Prior theoretical and empirical research suggests that spin-offs are somehow mirror images of their parents in terms of their organizational routines. Organizational routines are transferred from the parent firm to the start-up through the founders of the spin-off. Founders adapt and improve the organizational routines of their parent firms. These routines involve both codified and tacit knowledge, which are

accumulated while being employed at the parent firm. This has been argued in the literature to significantly improve the survival probabilities of the spin-offs compared to other start-ups. Furthermore, evaluating the quality of the transferred organization routines is crucial for understanding variations in survival times even across types of spin-offs. We argue that spin-offs will have higher chances of survival if their parent firms are able to stay in business. Parent firm survival is used here as a rather crude proxy for the quality of the parent firm. Furthermore, we argue that the degree of absorption of the organizational routines will be shaped by the duration of founders' employment in the parent firm. These start-ups will simply have a superior knowledge endowment, because their founders have accumulated more knowledge at the parent through a longer period of employment. This will enable them to perform better, because they are better able to adapt and improve the routines, since their knowledge on them are presumably greater. Less tenured founders might have to rely more closely on the routines of the parent firms, because they do not have the amount of knowledge needed to sufficiently adapt the routines.

The results support to the theoretical proposition that the likelihood of survival is positively influenced by whether the firm is a spin-off (Hypothesis 1). We also confirmed that spin-offs with parent firms that stay in business in the years after the separation occurred have a significantly larger chance of surviving. Hence, it is important to consider the quality of the transferred organizational routines and accumulated knowledge before evaluating the survival probabilities of a given type of spin-off (Hypothesis 2). Finally, the results also suggest that the length of tenure at the parent firm has a significant positive impact on the survival time distribution. Longer tenure with the parent firm enables the spin-off to survive significantly longer than its lower tenured counterparts (Hypothesis 3). Experience from within the industry has a larger effect on survival than tenure, but we emphasize that knowledge from a specific parent firm have a significant impact. This indicates quite strongly that the knowledge that founders pick up from specific parent firms have a positive impact on their start-up the longer they have been employed in that organization.

These findings support the general argument that the survival chances of new organizations are positively influenced by the knowledge endowment of their founders. Knowledge and experience from

within the same industry will make spin-offs more successful from the outset (compared to other start-ups), because their organizational routines and accumulated knowledge will be better shaped for success. It is clearly a benefit to have experience from a parent organization that survives. Even though this is a rather crude measure of the parent's success, our results nevertheless indicate that prior experience in such an organization facilitates access to knowledge and routines, which ultimately will be of significant benefit to the employee(s) involved in a start-up.

Our evidence showed that a parent firm that ceases to exist in the same year that the spin off occurs has a negative impact on that particular start-up. This holds many possible explanations and implications. It is likely as argued in our theoretical discussion that the routines and knowledge founders gain in a dying organization are not able to secure the existence of their own firm. Theoretically, they could learn from the failure and end up doing a better job. However, this is not supported by our findings. We find that they are more likely to take the failure with them to the new firm. The evidence only holds for the parent firms that die in the same year of the spin off and not in the year after. Theoretically, we might argue that the transfer of bad routines that leads parent firms to fail should also have impact in the latter case as well. This was not confirmed by the data.

An alternative explanation to these finding might very well be that the spin-offs are founded by members of dying parent firms in order to avoid unemployment. In these cases, the separation of employer and employee happens on the basis of crises in the parent firm and not as response to the identification of opportunities (Shane, 2000) or disagreements on strategy (Klepper & Thompson, 2006), which are otherwise the dominating arguments behind spin-offs in the literature.

We might also turn the interpretation around the explain these finding. We have so far discussed the possibilities that parent firms influence spin-offs, but the opposite situation might also be the case. Spin-offs could influence parent firms just as well. This holds especially for small parent firms, which are likely to be severely hit, when key personnel leave the firm to found a spin-off. They could potentially suffer so hard that they have to close down. However, our analysis does not enable us to rule out any of these explanations. Nevertheless, It is important to take founders' histories into account when studying spin-offs

and to understand that these organizations are rather heterogeneous. Moreover, it is important to recognize that the quality of parent firm will have vital influence on the performance prospect of any spin-off.

We find evidence that tenure will significantly increase the probability that a spin-off survives. The theory is that the longer a person is employed at the parent firm before the spin-off occurs, the more likely the spin-off will be influenced by the organizational routines of the parent. Inherited effects are stronger, the longer the founder was employed by the parent. A stronger inherited effect on the organizational routines should consequently lead to a better likelihood of survival, because the founders are better endowed to adapt, improve and reflect on the routines of the parent firm. We briefly extended this argument also to consider the quality of the parent firm in our theoretical discussion. We have tried to investigate whether tenure from dying parent firms would have an effect on the survival probability. This was so far unsuccessful as the variables tried introduced multicollinearity. Nevertheless, the tenure effect shows that parent firms have an important impact on the survival of spin-offs. The fact that tenure is significant and positive in this respect supports the assumption that parent-specific knowledge and routines are the explanation for the increased probability of survival.

These results show that there is an important effect of organizational routines even when we distinguish between different types of spin-offs with quality parents. If the founders have been employed a relatively longer time at the parent, this will positively influence the chances of survival of spin-offs, because they have a much stronger heritage. The founders are able to replicate and modify the organizational routines of the parent firms to a much better extent, because they have been employed for a relatively longer time. A longer duration of employment at the parent firm is likely to increase the degree of absorption and accumulation of knowledge.

The results of the present study imply that the best start-ups come from the best existing firms. As a result of their higher chances of survival, these spin-offs bring higher benefits to the economy. Founders of these firms are able to build on inherited organizational routines that enable them to perform better than other start-ups. Knowledge gained in an existing firm is a direct advantage for a new organization. The longer the founders have been employed in the parent firm, the larger is this effect. This clearly

demonstrates that it is the source of experience and the type of start-up that is at the centre of survival, and subsequent long-term economic growth.

Many countries and governments focus heavily on entrepreneurship and increased firm founding to promote economic growth. This occurs often with no account being taken of our finding, that the background of the start-ups has clear and significant effects on life chances. It would perhaps be more rational for policy makers to focus on specific types of start-up rather than simply encouraging increased numbers of start-ups.

Organizations founded by individuals from within the industry have relatively higher chances of survival. This result clearly directs attention towards the possible negative effect of non-compete covenants in the contracts of employees. If spin-offs are more likely to survive, they will also be socially beneficial and provide the economy with valuable input as promoters of growth. In this respect, it would probably be of benefit to the economy if firms could be dissuaded from imposing conditions that prevent former employees from starting up businesses within the same industry. In fact, legislators may want to reduce the stigma often associated with employees who leave companies to start their own firms.

The findings from this study imply that organizational routines carried to spin-offs from their parents have a significant impact on the performance of new organizations. Spin-offs with better performing parents are based on better routines and knowledge, which positively increases their chances of survival. On the other hand, unhealthy routines negatively influence the likelihood of survival of spin-offs. It is not just a matter of being a spin-off but of being the right type of spin-off.

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TABLES AND FIGURES

TABLE 1
Descriptive Statistics and Correlations

Variable	Mean	S.D.	v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11	v12	v13	v14
v1: Spin-off	0.13	0.34														
v2: Tenure	1.28	1.45	0.42													
v3: Industry experience	0.50	0.67	0.53	0.16												
v4: Parent dies same year	0.05	0.21	0.56	0.21	0.28											
v5: Parent dies one year after seperation	0.04	0.20	0.53	0.25	0.31	-0.05										
v6: Parent dies two years after seperation	0.00	0.07	0.18	0.08	0.09	-0.02	-0.01									
v7: Top management in parent firm	0.78	0.36	0.12	0.11	0.17	0.08	0.05	0.03								
v8: Parent size	13.73	74.25	0.47	0.16	0.24	0.36	0.13	0.08	0.07							
v9: Log(Size of start-up)	1.98	0.93	0.33	0.38	0.22	0.16	0.23	0.05	0.09	0.15						
v10: Corporation	0.39	0.49	0.20	0.24	0.12	0.11	0.11	0.02	0.12	0.14	0.28					
v11: Copenhagen start-up	0.21	0.41	0.00	0.03	0.00	0.02	-0.03	0.02	-0.01	-0.03	-0.08	-0.05				
v12: GDP growth	1.03	0.01	0.01	0.03	0.03	-0.03	0.03	-0.01	0.02	-0.07	0.05	0.04	0.00			
v13: Proportion of high educated employees	0.07	0.28	0.01	0.07	-0.06	0.04	-0.04	0.00	-0.02	0.08	-0.14	0.06	0.11	0.00		
v14: Proportion of medium educated employees	0.24	0.38	0.04	0.13	-0.06	0.05	-0.02	-0.01	0.01	0.09	-0.23	0.09	0.06	0.02	0.11	
v15: Proportion of low educated employees	0.41	0.26	0.01	0.00	0.03	0.01	0.00	-0.01	0.08	0.00	-0.05	0.02	-0.04	0.04	-0.21	-0.30

Note: Correlation estimates in bold indicate significance at a 5% level

TABLE 2
Results of Probit Regressions: Modelling the Probability of Exit

Variable	Model 1		Model 2		Model 3		Model 4	
	Parameter estimate	Standard Error	Parameter estimate	Standard Error	Parameter estimate	Standard Error	Parameter estimate	Standard Error
Spin-off dummy	-0.093 **	0.041	-0.006	0.048	-0.169 **	0.072	-0.177 **	0.072
Spin-off *								
Tenure			-0.022 **	0.009	-0.020 **	0.009	-0.017 *	0.009
Parent dies same year					0.390 **	0.081	0.398 **	0.081
Parent dies one year after separation					0.075	0.083	0.075	0.083
Parent dies two years after separation					0.135	0.175	0.152	0.176
Top management in parent firm							-0.145 **	0.032
Parent size	0.001 **	0.000	0.001 **	0.000	0.001 **	0.000	0.001 **	0.000
Industry experience			-0.057 **	0.020	-0.055 **	0.020	-0.043 **	0.020
Log(Size)	-0.109 **	0.015	-0.097 **	0.015	-0.097 **	0.015	-0.095 **	0.015
Corporation	-0.019	0.025	-0.014	0.025	-0.014	0.025	-0.007	0.025
Copenhagen start-up	0.057 **	0.028	0.062 **	0.028	0.057 **	0.028	0.059 **	0.028
GDP growth	-6.796 **	0.728	-6.772 **	0.728	-6.755 **	0.729	-6.808 **	0.730
Proportion of high educated employees	0.024	0.043	0.026	0.043	0.018	0.043	0.015	0.043
Proportion of medium educated employees	0.018	0.036	0.028	0.036	0.027	0.036	0.030	0.036
Proportion of low educated employees	-0.097 *	0.049	-0.089 *	0.050	-0.091 *	0.050	-0.074	0.050
Intercept	5.939 **	1.736	6.026 **	1.738	5.899 **	1.741	5.871 **	1.742
Industry Dummies	Yes		Yes		Yes		Yes	
Log-likelihood	7666.2		-7660.1		-7646.5		7636.1	

Note: '**' significant at a .05 level, and '*' significant at a .10 level.

TABLE 3
Similarities between Spin-offs and their Parents

Industry	Proportion of female employees	Average wage of employees (DKK)	Average education level	Average labor market experience	Proportion of top-managers
Food, beverages and tobacco	0.62 ***	0.44 ***	0.23	0.83 ***	0.37 **
Textile and footwear	0.76 ***	0.48 ***	0.56 ***	0.91 ***	0.53 ***
Wood, paper and graphics	0.72 ***	0.35 ***	0.69 ***	0.82 ***	0.56 ***
Chemical	0.60 ***	0.63 ***	0.63 ***	0.92 ***	0.50 ***
Non-metallic mineral	0.33	0.28	0.48 **	0.90 ***	0.45 ***
Machinery and electronics	0.62 ***	0.38 ***	0.62 ***	0.91 ***	0.47 ***
Furniture	0.79 ***	0.36 **	0.65 ***	0.93 ***	0.15
Total Sample	0.78 ***	0.43 ***	0.65 ***	0.88 ***	0.50 ***

Note: Standard errors in parentheses. '***' significant at a .01 level, '**' significant at a .05 level, and '*' significant at a .10 level.